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TITLE: ELECTRONIC COMPONENT MOUNTER AND ITS MANUFACTURE

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ABSTRACT:

PURPOSE: To fine down the pitches of the tip of the conductor wiring of a semiconductor chip mounter.

CONSTITUTION: The first layer wiring board 10 is provided with an aperture 11 for mounting a semiconductor chip at the center, and through hole 12 in the vicinity of the periphery. The second wiring board 20 is provided with an aperture 21 larger than the aperture 11 at the center, and is provided with a through hole 22 in the vicinity of the periphery. The second wiring board is stacked on the first wiring board through an adhesive layer 14. A stacked board T is provided with an aperture H with a difference in level for accommodating a semiconductor chip. Therefore, terminals for connection with a semiconductor chip by wire bonding can be used in two stages, so the density of terminals can be roughly doubled substantially. An adhesive sheet 24 is provided in the vicinity of the periphery of the surface of the second wiring board, and the tip of an inner lead 31 a is bonded in the condition that it is arranged on the through hole 22, and it is joined with the through hole 22 by the solder which has gotten up through the through hole.

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(54) ELECTRONIC COMPONENT MOUNTER AND ITS MANUFACTURE

(57)Abstract:

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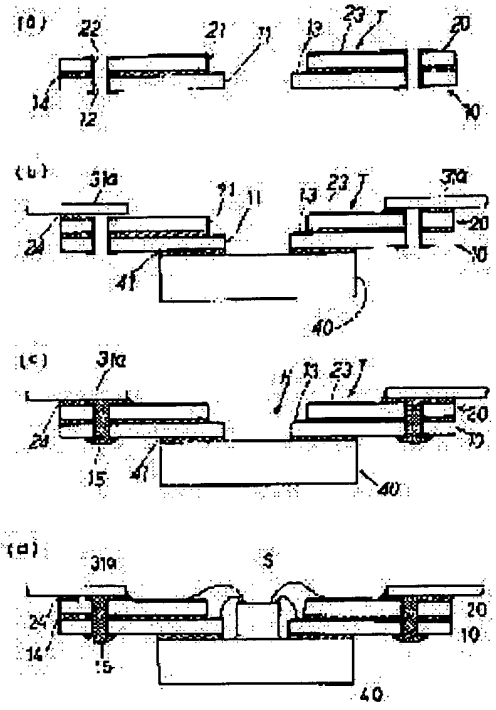
CONSTITUTION: The first layer wiring board 10 is provided with an aperture 11 for mounting a semiconductor chip at the center, and through hole 12 in the vicinity of the periphery. The second wiring board 20 is provided with an aperture 21 larger than the aperture 11 at the center, and is provided with a through hole 22 in the vicinity of the periphery. The second wiring board is stacked on the first wiring board through an adhesive layer 14. A stacked board T is provided with an aperture H with a difference in level for accommodating a semiconductor chip. Therefore, terminals for connection with a semiconductor chip by wire bonding can be used in two stages, so the density of terminals can be roughly doubled substantially. An adhesive sheet 24 is provided in the vicinity of the periphery of the surface of the second wiring board, and the tip of an inner lead 31 a is bonded in the condition that it is arranged on the through hole 22, and it is joined with the through hole 22 by the solder which has gotten up through the through hole.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] Electronic-parts loading equipment characterized by providing the following. The laminated circuit board which constituted electronic-parts hold opening which has two or more through holes in the same position near the periphery mutually, and is made to carry out the laminating of two or more wiring substrates which prepared opening from which a size differs mutually through an adhesives layer in the sequence of the size of this opening, and has a level difference. The leadframe by which junction fixation was carried out through solder at the aforementioned through hole while adhesion fixation was carried out in the state where at least the part has been arranged on the aforementioned through hole through the adhesives layer prepared in the front face of a side with the aforementioned large opening of this laminated circuit board near the periphery. The electronic-parts adhesion substrate by which covered the aforementioned electronic-parts hold opening and adhesion fixation was carried out through the adhesives layer at the rear-face side of the aforementioned laminated circuit board.
[Claim 2] The manufacture method of the electronic-parts loading equipment characterized by providing the following. The wiring substrate laminating process which constitutes electronic-parts hold opening which has two or more through holes in the same position near the periphery mutually, and is made to carry out the laminating of two or more wiring substrates which prepared opening from which a size differs mutually through an adhesives layer in the sequence of the size of this opening, and has a level difference. The leadframe adhesion process of carrying out adhesion fixation of the leadframe in the state where at least the part has been arranged on the aforementioned through hole through the adhesives layer prepared in the front face of a side with the aforementioned large opening of this laminated circuit board near the periphery. The soldered joint formation process which solder is raised through the aforementioned through hole from the rear-face side of the laminated circuit board which the aforementioned leadframe pasted up, and forms a soldered joint between the aforementioned leadframes. The electronic-parts adhesion substrate adhesion process of covering the aforementioned electronic-parts hold opening and pasting up an electronic-parts adhesion substrate on the rear-face side of the aforementioned laminated circuit board through an adhesives layer.
[Claim 3] Electronic-parts loading equipment characterized by providing the following. The wiring substrate which has two or more through holes in the near position of a periphery, and prepared the electronic-parts loading section in it. The laminated circuit board constituted by at least one wiring substrate which has a through hole in the same position as this wiring substrate by which the laminating was carried out, and prepared opening on this wiring substrate at the aforementioned electronic-parts loading section, and by which drilling was carried out. The leadframe by which junction fixation was carried out through solder at the aforementioned through hole while adhesion fixation was carried out in the state where at least the part has been arranged on the aforementioned through hole through the adhesives layer prepared in the front face of a wiring substrate on which drilling of this laminated circuit board was carried out [aforementioned] near the inside of the periphery.
[Claim 4] The manufacture method of the electronic-parts loading equipment characterized by providing the following. The wiring substrate laminating process of carrying out the at least one-sheet laminating

of the wiring substrate which has a through hole in the same position as this wiring substrate, and prepared opening in the aforementioned electronic-parts loading section and by which drilling was carried out to the wiring substrate which has two or more through holes in the near position of a periphery, and prepared the electronic-parts loading section in it. The leadframe adhesion process of carrying out adhesion fixation of the leadframe in the state where at least the part has been arranged on the aforementioned through hole through the adhesives layer prepared in the front face of the wiring substrate by which the said drilling was carried out near the periphery. The soldered joint formation process which solder is raised through the aforementioned through hole from the rear-face side of the laminated circuit board which the aforementioned leadframe pasted up, and forms a soldered joint between the aforementioned leadframes.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] the conductor arranged by the wiring substrate while this invention related to electronic-parts loading equipment and being manufactured especially using the so-called leadframe -- it is related with the fine electronic-parts loading equipment of the pitch of the bonding terminal for connection with the terminal of the electronic parts of wiring
[0002]
[Description of the Prior Art] the former and this kind of electronic-parts loading equipment -- the conductor of a wiring substrate -- the pitch of the bonding terminal for connection with the terminal of electronic parts was made fine by making the pitch of wiring fine And having considered the crushing width of face of a bonding wire, the limitation of the pitch of the bonding terminal of this electronic-parts loading equipment was about 180 micrometers.
[0003]
[Problem(s) to be Solved by the Invention] However, the request of the high density assembly of electronic-parts loading equipment is size, and the extraordinary fine pitch of 100 micrometers or less also in the pitch of a bonding terminal is demanded. In order to acquire this property, the method shown in JP,2-5014,B can also be used for example, about the substrate for a pin grid array package. According to this official report, the substrate which lays two or more wiring substrates from which the size of the area of each semiconductor device hold opening differs on top of descending of area, and does not prepare opening in an upper-and-lower-sides side is stuck. And ****** processing was performed to this substrate by which the laminating was carried out after place Rika **** of plurality, such as hole dawn and copper plating, at the substrate by the side of a front face. Thus, the stage is established in the peripheral wall of the semiconductor device hold section, and fine pitch-ization of a bonding terminal is attained in efficiency by making two or more steps distribute the bonding position by the side of wiring of wire bonding. However, according to the above-mentioned method, while the manufacturing process of a laminated circuit board becomes long, in order to bear the stress which joins a substrate in a manufacturing process, there is a problem of having to thicken thickness of a substrate. what is going to solve the problem which described this invention above -- it is -- simple structure -- and a conductor -- it aims at offering the electronic-parts loading equipment which made the pitch of wiring very [in efficiency] fine
[0004]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the constitutional feature of invention concerning the above-mentioned claim 1 Two or more wiring substrates which prepared opening from which a size differs mutually [have two or more through holes in the same position near the inside of a periphery mutually, and] The laminated circuit board which constituted electronic-parts hold opening which is made to carry out a laminating through an adhesives layer in the sequence of the size of this opening, and has a level difference, While adhesion fixation is carried out in the state where at least the part has been arranged on a through hole through the adhesives layer

prepared in the front face of a side with large opening of a laminated circuit board near the inside of the periphery It is in having prepared the leadframe by which junction fixation was carried out through solder at the through hole, and the electronic-parts adhesion substrate by which covered electronic-parts hold opening and adhesion fixation was carried out through the adhesives layer at the rear-face side of a laminated circuit board.

[0005] Moreover, the constitutional feature of invention concerning the above-mentioned claim 2 Two or more wiring substrates which prepared opening from which a size differs mutually [have two or more through holes in the same position near the periphery mutually, and] The wiring substrate laminating process which constitutes electronic-parts hold opening which is made to carry out a laminating through an adhesives layer in the sequence of the size of this opening, and has a level difference, The leadframe adhesion process of carrying out adhesion fixation of the leadframe in the state where at least the part has been arranged on a through hole through the adhesives layer prepared in the front face of a side with large opening of a laminated circuit board near the inside of the periphery, The soldered joint formation process which solder is raised through a through hole from the rear-face side of the laminated circuit board which the leadframe pasted up, and forms a soldered joint between leadframes, It is in having established the electronic-parts adhesion substrate adhesion process of covering electronic-parts hold opening and pasting up an electronic-parts adhesion substrate on the rear-face side of a laminated circuit board through an adhesives layer.

[0006] Moreover, the constitutional feature of invention concerning the above-mentioned claim 3 The wiring substrate which has two or more through holes in the near position of a periphery, and prepared the electronic-parts loading section in it, The laminated circuit board constituted by at least one wiring substrate which has a through hole in the same position as the wiring substrate by which the laminating was carried out, and prepared opening on the wiring substrate at the electronic-parts loading section, and by which drilling was carried out, While adhesion fixation is carried out in the state where at least the part has been arranged on a through hole through the adhesives layer prepared in the front face of a wiring substrate on which drilling of the laminated circuit board was carried out near the inside of the periphery, it is in having prepared the leadframe by which junction fixation was carried out in the through hole through solder.

[0007] Moreover, the constitutional feature of invention concerning the above-mentioned claim 4 To the wiring substrate which has two or more through holes in the near position of a periphery, and prepared the electronic-parts loading section in it The wiring substrate laminating process to which the at least one-sheet laminating of the wiring substrate which has a through hole in the same position as a wiring substrate, and prepared opening in the electronic-parts loading section, and by which drilling was carried out is carried out, The leadframe adhesion process of carrying out adhesion fixation of the leadframe in the state where at least the part has been arranged on a through hole through the adhesives layer prepared in the front face of the wiring substrate by which drilling was carried out near the periphery, Solder is raised through a through hole from the rear-face side of the laminated circuit board which the leadframe pasted up, and it is in having established the soldered joint formation process which forms a soldered joint between leadframes.

[0008]

[Function and Effect of the Invention] In invention concerning the claim 1 constituted as mentioned above, since electronic-parts hold opening which has a level difference in a peripheral wall by having carried out the laminating of two or more wiring substrates which prepared opening from which a size differs mutually through the adhesives layer in the sequence of the size of opening is prepared, the connecting location of wire bonding with electronic parts can be distributed and prepared in two or more steps. Consequently, the pitch of the wire-bonding end-connection child of electronic-parts loading equipment can be made into the conventional double-precision grade in efficiency.

[0009] In invention concerning the claim 2 constituted as mentioned above, a through hole is arranged, and the laminating of two or more wiring substrates is carried out through an adhesives layer in the sequence of the size of opening, and adhesion fixation of the leadframe is carried out in the state where at least the part has been arranged on a through hole through the adhesives layer prepared in the front

face of a side with still larger opening of a laminated circuit board near the inside of the periphery. And connection between a laminated circuit board and a leadframe can be easily formed by making solder advance into the arranged through hole, and preparing a soldered joint between a leadframe and a through hole. Consequently, since the manufacturing process of laminating type electronic-parts loading equipment can be shortened compared with the conventional method, the price of electronic-parts loading equipment can be reduced. Moreover, according to invention concerning a claim 2, the pitch of the wire-bonding end-connection child of electronic-parts loading equipment can be made into the conventional double-precision grade in efficiency like invention concerning the above-mentioned claim 1 by having prepared electronic-parts hold opening with a level difference. Furthermore, since the wiring substrate of an excellent article is chosen and it can stick, while being able to raise the manufacture yield compared with elegance conventionally according to invention concerning a claim 2, reliability can also be raised very much.

[0010] Moreover, in invention concerning the claim 3 constituted as mentioned above, the connecting location of wire bonding with the electronic parts prepared in the electronic-parts loading section can be distributed and prepared in two or more steps of the wiring substrate by which drilling was carried out to the wiring substrate by having carried out the laminating of the wiring substrate by which drilling was carried out to the wiring substrate. Consequently, the pitch of the wire-bonding end-connection child of electronic-parts loading equipment can be made into the conventional double-precision grade in efficiency.

[0011] Moreover, in invention concerning the claim 4 constituted as mentioned above, adhesion fixation of the leadframe is carried out in the state where at least the part has been arranged on a through hole through the adhesives layer which prepared the wiring substrate by which drilling was carried out on the wiring substrate near the inside of the periphery in the front face of the wiring substrate by which was made to arrange and carry out the laminating of the through hole, and drilling was carried out further. And connection between a laminated circuit board and a leadframe can be easily formed by making solder advance into the arranged through hole, and preparing a soldered joint between a leadframe and a through hole. Consequently, since the manufacturing process of laminating type electronic-parts loading equipment can be shortened compared with the conventional method, the price of electronic-parts loading equipment can be reduced. Moreover, according to invention concerning a claim 4, the pitch of the wire-bonding end-connection child of electronic-parts loading equipment can be made into the conventional double-precision grade in efficiency like invention concerning the above-mentioned claim 3 by having distributed and prepared the connecting location of wire bonding with the electronic parts prepared in the electronic-parts loading section in two or more steps of the wiring substrate by which drilling was carried out to the wiring substrate. Furthermore, since the wiring substrate of an excellent article is chosen and it can stick, while being able to raise the manufacture yield compared with elegance conventionally according to invention concerning a claim 4, reliability can also be raised very much.

[0012]

[Example] Hereafter, a drawing explains one example of this invention. Drawing 1 shows some semiconductor chip loading equipments concerning the 1st example by the perspective diagram, and drawing 2 shows typically the cross section of the semiconductor chip loading equipment in an attachment process. this semiconductor chip loading equipment -- the 1st-layer wiring substrate 10, the 2nd-layer wiring substrate 20, a leadframe 30, and a conductor -- it has the board 40

[0013] The 1st-layer wiring substrates 10 are the copper-clad multilayer glass / triazine substrate of 0.1mm ** with a square, and they have formed two or more through holes 12 of 0.3mmphi which penetrated the substrate side in the periphery section while they form the opening 11 for semiconductor chip loading in the center. Nickel plating and gilding are given to the wall of a through hole 12 after copper plating, and the conductive layer is formed. and the thing which the front-face side of the 1st-layer wiring substrate 10 does for the photo etching of the copper layer of substrate 10 front face -- the methods of four from about 11 opening -- turning -- every 38 each a total of 152 conductors -- wiring 13 forms -- having -- **** -- each -- a conductor -- a part of heel of wiring 13 has flowed in the through hole 12 moreover, a conductor -- gilding 13a for wire bonding is formed in the toe of wiring 13, and the

bonding terminal is 0.16mm pitch
[0014] The 2nd-layer wiring substrates 20 are the copper-clad glass / triazine substrate of 0.1mm ** with the same square as the 1st-layer wiring substrate 10, and have formed the opening 21 for semiconductor chip loading with a bigger area than the opening 11 of the 1st-layer wiring substrate 10 in the center. Moreover, the 2nd-layer wiring substrate 20 has formed two or more through holes 22 of 0.3mmphi which penetrated the substrate side in the same position as the through hole 12 of the 1st-layer wiring substrate 10 of the periphery section. Nickel plating and gilding are given to the wall of a through hole 12 after copper plating, and the conductive layer is formed. and the thing done to the front-face side of the 2nd-layer wiring substrate 20 for the photo etching of the copper layer of substrate 20 front face -- the methods of four from about 21 opening -- turning -- every 38 each a total of 152 conductors -- wiring 23 forms -- having -- **** -- each -- a conductor -- a part of heel of wiring 23 has flowed in the through hole 22 moreover -- at least -- a conductor -- gilding 23a for wire bonding is formed in the toe of wiring 23, and the bonding terminal is 0.16mm pitch
[0015] A leadframe 30 is a product made from a copper alloy with a thickness of 0.15mm, and has the lead 31 of 304 connected with the frame (an illustration ellipsis is carried out). The lead is supported by dambar 31c in middle, and is divided into inside inner lead 31a and outside outer-lead 31b. And where alignment of a leadframe 30 and the 2nd wiring substrate 20 is carried out, as for inner lead 31a, a nose of cam is located on a through hole 22. a conductor -- a board 40 is a product made from an oxygen free copper with a thickness of 1.3mm, nickel plating is performed to the bottom side, and the adhesives sheet 41 of 60-micrometer thickness of the heat-resistant epoxy base is stuck on the front face except for central semiconductor chip loading part 40a a conductor -- a board 40 functions as a heat sink while being an object for semiconductor chip adhesion
[0016] Below, drawing 2 explains the assembly of semiconductor chip loading equipment. First, the two-layer laminated circuit board T is obtained by applying adhesives 14 to the predetermined position by the side of the front face of the 1st-layer wiring substrate 10, piling up the 2nd-layer wiring substrate 20 and carrying out heating sticking by pressure, where alignment of a through hole 12 and the through hole 22 of the 2nd-layer wiring substrate 20 is carried out on it (refer to drawing 2 (a)). Next, the adhesives sheet 24 with a thickness of about 0.06mm is stuck on the outside field of the through hole 22 by the side of the front face of the 2nd-layer wiring substrate 20. And by carrying out alignment of the leadframe 30 to the 2nd-layer wiring substrate 20, arranging the point of inner lead 31a on a through hole 22, and carrying out heating sticking by pressure at the adhesives sheet 24, the adhesives sheet 24 hardens and inner lead 31a is fixed to the front-face side of the 2nd-layer wiring substrate 20 (refer to drawing 2 (b)). And a leadframe 30 is fixed easily and firmly to a laminated circuit board T by solder 12a which went up through holes 12 and 22 by turning a leadframe 30 for the laminated circuit board T which this leadframe 30 pasted up up, and contacting the rear face of a laminated circuit board T to a jet solder tub (refer to drawing 2 (c)). furthermore, the rear-face side of the 1st-layer wiring substrate 10 -- a conductor -- a board 40 is pasted up through the adhesives layer 41
[0017] the conductor which formed the semiconductor chip loading equipment obtained as mentioned above in each [these] stage since the opening H which holds a semiconductor chip was formed in two steps of size -- wiring can be used as a bonding terminal of the wire-bonding connection with a semiconductor chip Therefore, compared with the case of an one-layer wiring substrate, by forming wiring of the same pitch, the bonding terminal of the wiring pitch about real double precision can be obtained, and the packaging density of semiconductor chip loading equipment can be raised to a double-precision grade. Moreover, semiconductor chip loading equipment above-mentioned laminating type pastes up a wiring substrate on lamination, and pastes up a leadframe on a laminated circuit board by the adhesives layer, and since it can manufacture by making this laminated circuit board immersed in a solder layer and the process is easy compared with semiconductor chip loading equipment conventional laminating type, it is provided very cheaply. Moreover, since thickness can carry out the laminating of the thin wiring substrate respectively, thickness of a laminated circuit board can be made thin, and the inflow nature of the mould resin at the time of a transfer mold is good, and excellent in resin-seal nature. Furthermore, since semiconductor chip loading equipment above-mentioned laminating type chooses the

wiring substrate of an excellent article and it is made to carry out the laminating of this, compared with the conventional thing, the manufacture yield is high and the reliability of a product is also excellent.
[0018] the next -- a conductor -- bonding of the semiconductor chip S is carried out to semiconductor chip loading part 30a of a board 30 with adhesives and the conductor of the electrode of semiconductor chip S, the 1st-layer wiring substrate 10, and the 2nd-layer wiring substrate 20 -- it is made to connect by wire bonding between wiring 13 (refer to drawing 2 (d)) then, a conductor -- by making it expose, making and carrying out the resin seal of the lateral surface of a board 30, cutting a leadframe further, and bending a lead, as shown in drawing 3 , a semiconductor device is completed
[0019] Below, a drawing explains the 2nd example. A heat sink is not prepared as the semiconductor chip loading section, but it is made to prepare on a wiring substrate in the 2nd example, as shown in drawing 4 (a). And it was made to carry out the laminating of the wiring substrate which prepared opening on the wiring substrate. And after carrying semiconductor chip S in semiconductor chip loading section 50a, the end-connection child of wire bonding can be distributed and prepared in the wiring substrate 50 and the wiring substrate 60 which prepared opening. Therefore, compared with the case of an one-layer wiring substrate, by forming wiring of the same pitch, the bonding terminal of the wiring pitch about real double precision can be obtained, and the effect acquired in the 1st example of the above and the same effect can be acquired -- the packaging density of semiconductor chip loading equipment can be raised to a double-precision grade. In the 2nd example, especially when the thermolysis from a semiconductor chip does not become a problem, it is effective. Moreover, you may make it prepare crevice 50b by Zagury processing in the semiconductor chip loading section, as shown in drawing 4 (b).
[0020] in addition, each above-mentioned example -- setting -- one semiconductor chip -- a conductor -- although the case where it carries to a board is explained -- two or more semiconductor chips -- a conductor -- you may make it make it carry to a board Moreover, you may make it assemble other electronic-parts chips in the above-mentioned example instead of a semiconductor chip. furthermore, each above-mentioned example -- setting -- a wiring substrate, a leadframe, and a conductor -- the configuration of a board etc., the quality of the material, a number, etc. can be suitably changed according to the purpose use

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[Translation done.]

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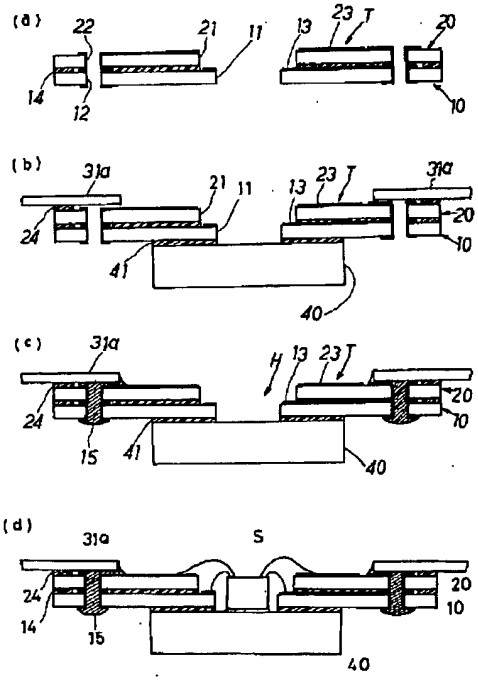
(54)【発明の名称】　電子部品搭載装置及びその製造方法

(57)【要約】
【目的】半導体チップ搭載装置の導体配線先端のピッチを細かくする。
【構成】第１層配線基板１０は、中央に半導体チップ搭載用の開口部１１を設けており、外周近傍にスルーホール１２を設けている。第２層配線基板２０は、中央に開口部１１より大きな開口部２１を設けており、外周近傍にスルーホール２２を設けている。第１層配線基板上に接着剤層１４を介して第２層配線基板を積層させる。積層基板Ｔには、半導体チップを収容する段差のある開口部Ｈが設けられる。そのため、半導体チップとのワイヤボンディング接続用の端子を２段で用いることができ、端子密度を実質的に２倍程度にすることができる。第２層配線基板の表面の外周近傍に接着剤シート２４を設け、インナーリード３１ａの先端をスルーホール２２の上部に配置した状態で接着させ、スルーホールを上昇したはんだによりスルーホール２２に接合させる。



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【特許請求の範囲】

【請求項１】　互いに外周の近傍の同一位置に複数のスルーホールを有し、かつ互いに大きさの異なる開口部を設けた複数の配線基板を、同開口部の大きさの順序で接着剤層を介して積層させて段差のある電子部品収容開口部を構成した積層基板と、

同積層基板の前記開口部の大きい側の表面に、その外周の近傍に設けた接着剤層を介して少なくとも一部が前記スルーホール上に配置された状態で接着固定されると共に、はんだを介して前記スルーホールに接合固定されたリードフレームと、

前記積層基板の裏面側に前記電子部品収容開口部を覆って接着剤層を介して接着固定された電子部品接着基板とを設けたことを特徴とする電子部品搭載装置。

【請求項２】　互いに外周の近傍の同一位置に複数のスルーホールを有し、かつ互いに大きさの異なる開口部を設けた複数の配線基板を、同開口部の大きさの順序で接着剤層を介して積層させて段差のある電子部品収容開口部を構成する配線基板積層工程と、

同積層基板の前記開口部の大きい側の表面に、その外周の近傍に設けた接着剤層を介して少なくとも一部が前記スルーホール上に配置された状態でリードフレームを接着固定させるリードフレーム接着工程と、

前記リードフレームの接着された積層基板の裏面側から前記スルーホールを通してはんだを上昇させ、前記リードフレームとの間にはんだ接合を形成するはんだ接合形成工程と、

前記積層基板の裏面側に前記電子部品収容開口部を覆って接着剤層を介して電子部品接着基板を接着させる電子部品接着基板接着工程とを設けたことを特徴とする電子部品搭載装置の製造方法。

【請求項３】　外周の近傍位置に複数のスルーホールを有し電子部品搭載部を設けた配線基板と、同配線基板上に積層された同配線基板と同一位置にスルーホールを有し前記電子部品搭載部に開口部を設けた少なくとも一枚の穴明された配線基板とにより構成した積層基板と、

同積層基板の前記穴明された配線基板の表面に、その外周の内側近傍に設けた接着剤層を介して少なくとも一部が前記スルーホール上に配置された状態で接着固定されると共に、はんだを介して前記スルーホールに接合固定されたリードフレームとを設けたことを特徴とする電子部品搭載装置。

【請求項４】　外周の近傍位置に複数のスルーホールを有し電子部品搭載部を設けた配線基板に、同配線基板と同一位置にスルーホールを有し前記電子部品搭載部に開口部を設けた穴明された配線基板を少なくとも１枚積層させる配線基板積層工程と、

同穴明された配線基板の表面に、その外周の近傍に設けた接着剤層を介して少なくとも一部が前記スルーホール上に配置された状態でリードフレームを接着固定させるリードフレーム接着工程と、

前記リードフレームの接着された積層基板の裏面側から前記スルーホールを通してはんだを上昇させ、前記リードフレームとの間にはんだ接合を形成するはんだ接合形成工程とを設けたことを特徴とする電子部品搭載装置の製造方法。

2

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、電子部品搭載装置に係り、特に所謂リードフレームを使用して製造されると共に配線基板に配設された導体配線の電子部品の端子との接続用ボンディング端子のピッチの細かい電子部品搭載装置に関する。

【０００２】

【従来の技術】従来、この種の電子部品搭載装置は、配線基板の導体配線のピッチを細かくすることにより、電子部品の端子との接続用ボンディング端子のピッチを細かくしていた。そして、かかる電子部品搭載装置のボンディング端子のピッチの限界は、ボンディングワイヤーのつぶれ幅を考えると１８０μｍ程度であった。

【０００３】

【発明が解決しようとする課題】しかるに、電子部品搭載装置の高密度実装の要請は大であり、ボンディング端子のピッチも１００μｍ以下という非常なファインピッチが要求されている。かかる特性を得るためには、例えばピングリッドアレイパッケージ用基板について、特公平２－５０１４号公報に示されている方法を用いることもできる。同公報によれば、各々の半導体素子収容開口部の面積の大きさの異なる複数の配線基板を、面積の大きい順に重ね合わせ、かつ上下側に開口部を設けない基板を貼り合わせていた。そして、この積層された基板に穴明け、銅めっき等の複数の処理加えた後に、表面側の基板に蓋取り加工を行っていた。このようにして、半導体素子収容部の周壁に段を設け、ワイヤーボンディングの配線側のボンディング位置を複数段に分散させることにより実効的にボンディング端子のファインピッチ化を図っている。しかし、上記方法によれば、積層基板の製造工程が長くなると共に製造工程において基板に加わる応力に耐えるために基板の厚みを厚くしなければならない等の問題がある。本発明は、上記した問題を解決しようとするもので、簡易な構造でかつ導体配線のピッチを実効的に非常に細かくした電子部品搭載装置を提供することを目的とする。

【０００４】

【課題を解決するための手段】上記目的を達成するために、上記請求項１に係る発明の構成上の特徴は、互いに外周の内側近傍の同一位置に複数のスルーホールを有し、かつ互いに大きさの異なる開口部を設けた複数の配線基板を、同開口部の大きさの順序で接着剤層を介して積層させて段差のある電子部品収容開口部を構成した積

層基板と、積層基板の開口部の大きい側の表面に、その外周の内側近傍に設けた接着剤層を介して少なくとも一部がスルーホール上に配置された状態で接着固定されると共に、はんだを介してスルーホールに接合固定されたリードフレームと、積層基板の裏面側に電子部品収容開口部を覆って接着剤層を介して接着固定された電子部品接着基板とを設けたことにある。

【０００５】また、上記請求項２に係る発明の構成上の特徴は、互いに外周の近傍の同一位置に複数のスルーホールを有し、かつ互いに大きさの異なる開口部を設けた複数の配線基板を、同開口部の大きさの順序で接着剤層を介して積層させて段差のある電子部品収容開口部を構成する配線基板積層工程と、積層基板の開口部の大きい側の表面に、その外周の内側近傍に設けた接着剤層を介して少なくとも一部がスルーホール上に配置された状態でリードフレームを接着固定させるリードフレーム接着工程と、リードフレームの接着された積層基板の裏面側からスルーホールを通してはんだを上昇させ、リードフレームとの間にはんだ接合を形成するはんだ接合形成工程と、積層基板の裏面側に電子部品収容開口部を覆って接着剤層を介して電子部品接着基板を接着させる電子部品接着基板接着工程とを設けたことにある。

【０００６】また、上記請求項３に係る発明の構成上の特徴は、外周の近傍位置に複数のスルーホールを有し電子部品搭載部を設けた配線基板と、配線基板上に積層された配線基板と同一位置にスルーホールを有し電子部品搭載部に開口部を設けた少なくとも一枚の穴明された配線基板とにより構成した積層基板と、積層基板の穴明された配線基板の表面に、その外周の内側近傍に設けた接着剤層を介して少なくとも一部がスルーホール上に配置された状態で接着固定されると共に、はんだを介してスルーホールに接合固定されたリードフレームとを設けたことにある。

【０００７】また、上記請求項４に係る発明の構成上の特徴は、外周の近傍位置に複数のスルーホールを有し電子部品搭載部を設けた配線基板に、配線基板と同一位置にスルーホールを有し電子部品搭載部に開口部を設けた穴明された配線基板を少なくとも１枚積層させる配線基板積層工程と、穴明された配線基板の表面に、その外周の近傍に設けた接着剤層を介して少なくとも一部がスルーホール上に配置された状態でリードフレームを接着固定させるリードフレーム接着工程と、リードフレームの接着された積層基板の裏面側からスルーホールを通してはんだを上昇させ、リードフレームとの間にはんだ接合を形成するはんだ接合形成工程とを設けたことにある。

【０００８】

【発明の作用・効果】上記のように構成した請求項１に係る発明においては、互いに大きさの異なる開口部を設けた複数の配線基板を、開口部の大きさの順序で接着剤層を介して積層させたことにより、周壁に段差のある電

子部品収容開口部が設けられるので、電子部品とのワイヤーボンディングの接続位置を複数段に分散して設けることが出来る。その結果、電子部品搭載装置のワイヤーボンディング接続端子のピッチを実効的に従来の２倍程度にすることができる。

【０００９】上記のように構成した請求項２に係る発明においては、複数の配線基板を、スルーホールを揃えかつ開口部の大きさの順序で接着剤層を介して積層させ、さらに積層基板の開口部の大きい側の表面に、その外周の内側近傍に設けた接着剤層を介して少なくとも一部がスルーホール上に配置された状態でリードフレームを接着固定させている。そして、揃えられたスルーホール内にはんだを進入させて、リードフレームとスルーホール間にはんだ接合を設けることにより、積層基板とリードフレームとの接続を容易に形成することが出来る。その結果、積層型の電子部品搭載装置の製造工程を、従来の方法に比べて短くすることができるので、電子部品搭載装置の価格を低減させることができる。また、請求項２に係る発明によれば、段差のある電子部品収容開口部を設けたことにより、上記請求項１に係る発明と同様に、電子部品搭載装置のワイヤーボンディング接続端子のピッチを実効的に従来の２倍程度にすることができる。さらに、請求項２に係る発明によれば、良品の配線基板を選んで貼り合わせることができるので、従来品にくらべて製造歩留りを高めることができると共に信頼性も非常に高めることができる。

【００１０】また、上記のように構成した請求項３に係る発明においては、配線基板に穴明された配線基板を積層させたことにより、電子部品搭載部に設けた電子部品とのワイヤーボンディングの接続位置を配線基板と穴明された配線基板の複数段に分散して設けることが出来る。その結果、電子部品搭載装置のワイヤーボンディング接続端子のピッチを実効的に従来の２倍程度にすることができる。

【００１１】また、上記のように構成した請求項４に係る発明においては、配線基板上に穴明された配線基板を、スルーホールを揃えて積層させ、さらに穴明された配線基板の表面に、その外周の内側近傍に設けた接着剤層を介して少なくとも一部がスルーホール上に配置された状態でリードフレームを接着固定させている。そして、揃えられたスルーホール内にはんだを進入させて、リードフレームとスルーホール間にはんだ接合を設けることにより、積層基板とリードフレームとの接続を容易に形成することが出来る。その結果、積層型の電子部品搭載装置の製造工程を、従来の方法に比べて短くすることができるので、電子部品搭載装置の価格を低減させることができる。また、請求項４に係る発明によれば、電子部品搭載部に設けた電子部品とのワイヤーボンディングの接続位置を配線基板と穴明された配線基板の複数段に分散して設けたことにより、上記請求項３に係る発明

5

と同様に、電子部品搭載装置のワイヤーボンディング接続端子のピッチを実効的に従来の２倍程度にすることができる。さらに、請求項４に係る発明によれば、良品の配線基板を選んで貼り合わせることができるので、従来品にくらべて製造歩留りを高めることができると共に信頼性も非常に高めることができる。

【００１２】

【実施例】以下、本発明の一実施例を図面により説明する。図１は、第１実施例に係る半導体チップ搭載装置の一部を斜視図により示したものであり、また、図２は組付け工程における半導体チップ搭載装置の断面を模式的に示したものである。この半導体チップ搭載装置は、第１層配線基板１０と第２層配線基板２０とリードフレーム３０と導体板４０とを備えている。

【００１３】第１層配線基板１０は、正方形で０．１ｍｍ厚の銅張り多層ガラス／トリアジン基板であり、中央に半導体チップ搭載用の開口部１１を設けると共に周縁部に基板面を貫通した０．３ｍｍφの複数のスルーホール１２を設けている。スルーホール１２の内壁には銅めっき後にニッケルめっき及び金めっきが施されて導電層が形成されている。そして、第１層配線基板１０の表面側は、基板１０表面の銅層をフォトエッチングすることにより開口部１１近傍から４方に向けて各３８本づつ合計１５２本の導体配線１３が形成されており、各導体配線１３の外端部の一部はスルーホール１２に導通している。また、導体配線１３の内端部にはワイヤーボンディング用の金めっき１３ａが形成され、そのボンディング端子は、０．１６ｍｍピッチである。

【００１４】第２層配線基板２０は、第１層配線基板１０と同一の正方形で０．１ｍｍ厚の銅張りガラス／トリアジン基板であり、中央に第１層配線基板１０の開口部１１より面積の大きな半導体チップ搭載用の開口部２１を設けている。また、第２層配線基板２０は、周縁部の第１層配線基板１０のスルーホール１２と同一位置に基板面を貫通した０．３ｍｍφの複数のスルーホール２２を設けている。スルーホール１２の内壁には銅めっき後にニッケルめっき及び金めっきが施されて導電層が形成されている。そして、第２層配線基板２０の表面側には、基板２０表面の銅層をフォトエッチングすることにより開口部２１近傍から４方に向けて各３８本づつ合計１５２本の導体配線２３が形成されており、各導体配線２３の外端部の一部はスルーホール２２に導通している。また、少なくとも導体配線２３の内端部にはワイヤーボンディング用の金めっき２３ａが形成され、そのボンディング端子は、０．１６ｍｍピッチである。

【００１５】リードフレーム３０は、厚さ０．１５ｍｍの銅合金製であり、フレーム（図示省略する）に連結された３０４本のリード３１を有している。リードは、中間にてダムバー３１ｃによって支持されており、内側のインナーリード３１ａと外側のアウターリード３１ｂとに分離されている。そして、リードフレーム３０と第２配線基板２０とを位置合わせした状態で、インナーリード３１ａは、先端がスルーホール２２上に位置するようになっている。導体板４０は、厚さ１．３ｍｍの無酸素銅製であり、下側面にはＮｉめっきが施されており、またその表面には中央の半導体チップ搭載部位４０ａを除いて耐熱エポキシベースの６０μｍ厚みの接着剤シート４１が貼り付けられている。導体板４０は、半導体チップ接着用であると共に放熱板として機能する。

6

【００１６】つぎに、半導体チップ搭載装置の組み立てについて、図２により説明する。まず、第１層配線基板１０の表面側の所定位置に接着剤１４を塗布し、その上にスルーホール１２と第２層配線基板２０のスルーホール２２とを位置合わせした状態で第２層配線基板２０を重ね合わせて、加熱圧着させることにより、２層の積層基板Ｔが得られる（図２（ａ）参照）。つぎに、第２層配線基板２０の表面側のスルーホール２２の外側領域に厚さ約０．０６ｍｍの接着剤シート２４を貼り付ける。そして、リードフレーム３０を第２層配線基板２０に位置合わせし、インナーリード３１ａの先端部をスルーホール２２上に配置させて接着剤シート２４に加熱圧着することにより、接着剤シート２４が硬化し、インナーリード３１ａが第２層配線基板２０の表面側に固定される（図２（ｂ）参照）。そして、このリードフレーム３０が接着された積層基板Ｔを、リードフレーム３０を上側にして噴流はんだ槽に積層基板Ｔの裏面を接触させることにより、リードフレーム３０はスルーホール１２及び２２を上昇したはんだ１２ａによって積層基板Ｔに容易にかつ強固に固定される（図２（ｃ）参照）。さらに、第１層配線基板１０の裏面側に導体板４０を接着剤層４１を介して接着させる。

【００１７】以上のようにして得られた半導体チップ搭載装置は、半導体チップを収容する開口部Ｈが大小の２段に形成されているので、これら各段に設けた導体配線を半導体チップとのワイヤーボンディング接続のボンディング端子として用いることが出来る。従って、１層配線基板の場合に比べて、同一ピッチの配線を設けることにより実質２倍程度の配線ピッチのボンディング端子を得ることができ、半導体チップ搭載装置の実装密度を２倍程度に高めることができる。また、上記積層タイプの半導体チップ搭載装置は、配線基板を貼り合わせ、リードフレームを接着剤層により積層基板に接着させ、この積層基板をはんだ層に浸漬させることにより製造することができるので、従来の積層タイプの半導体チップ搭載装置に比べて工程が簡単なので、非常に安価に提供される。また、厚みが各々薄い配線基板を積層することができるので、積層基板の厚みを薄くでき、トランスファーモールド時のモールド樹脂の流入性が良く、樹脂封止性に優れている。さらに、上記積層タイプの半導体チップ搭載装置は、良品の配線基板を選んで、これを積層させ

るようにしているので、従来のものに比べて、製造歩留りが高く、また製品の信頼性も優れている。

【００１８】つぎに、導体板３０の半導体チップ搭載部位３０ａに半導体チップＳを接着剤によりボンディングさせる。そして、半導体チップＳの電極と第１層配線基板１０および第２層配線基板２０の導体配線１３間ワイヤーボンディングにより接続させる（図２（ｄ）参照）。その後、導体板３０の外側面を露出させるようにして樹脂封止し、さらにリードフレームを切断し、リードを折り曲げることにより、図３に示すように、半導体装置が完成する。

【００１９】つぎに、第２実施例について図面により説明する。第２実施例においては、図４（ａ）に示すように、半導体チップ搭載部として放熱板を設けず、配線基板上に設けるようにしたものである。そして、配線基板上に開口部を設けた配線基板を積層させるようにした。そして、半導体チップ搭載部５０ａに半導体チップＳを搭載した後、ワイヤーボンディングの接続端子を配線基板５０と開口部を設けた配線基板６０に分散して設けることができる。従って、１層配線基板の場合に比べて、同一ピッチの配線を設けることにより実質２倍程度の配線ピッチのボンディング端子を得ることができ、半導体チップ搭載装置の実装密度を２倍程度に高めることができる等、上記第１実施例において得られる効果と同様の効果を得ることが出来る。第２実施例においては、半導体チップからの放熱が問題にならないような場合に特に有効である。また、図４（ｂ）に示すように、半導体チップ搭載部にザグリ加工による凹部５０ｂを設けるようにしてもよい。

【００２０】なお、上記各実施例においては、１個の半導体チップを導体板へ搭載した場合について説明しているが、複数個の半導体チップを導体板へ搭載させるようにしてもよい。また、上記実施例において、半導体チップの代わりに他の電子部品チップを組立てるようにしてもよい。さらに、上記各実施例において、配線基板、リードフレーム、導体板等の形状、材質、数等は目的用途に応じて適宜変更することができる。

【図面の簡単な説明】

【図１】本発明の第１実施例に係る半導体チップ搭載装置の一部を示す斜視図である。

【図２】同半導体チップ搭載装置の組付け工程における断面を示す模式図である。

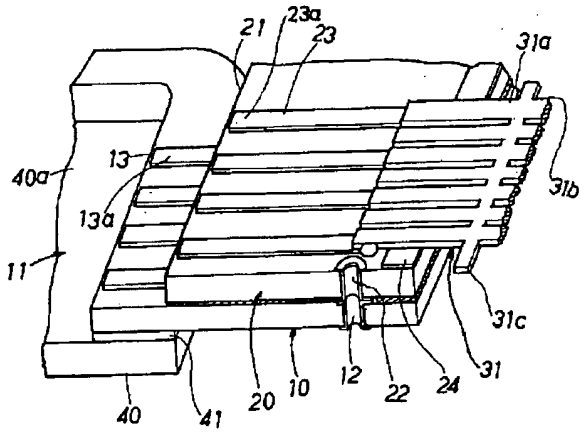
【図３】同半導体チップ搭載装置を用いた完成状態の半導体装置を示す模式図である。

【図４】第２実施例に係る半導体チップ搭載装置の一部を示す断面図である。

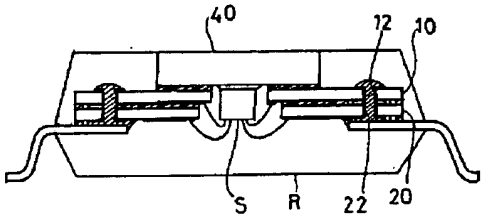
【符号の説明】

１０；第１層配線基板、１１；開口部、１２；スルーホール、１３；導体配線、１４；接着剤シート、２０；第２層配線基板、２１；開口部、２２；スルーホール、２３；導体配線、２４；接着剤シート、３０；リードフレーム、３１ａ；インナーリード、３１ｂ；アウターリード、４０；導体板、４１；接着剤シート、Ｓ；半導体チップ。

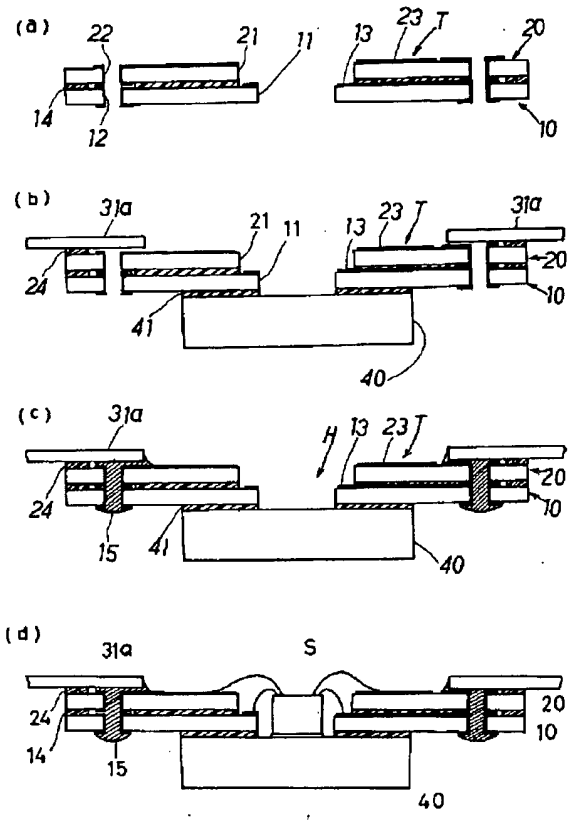
【図１】



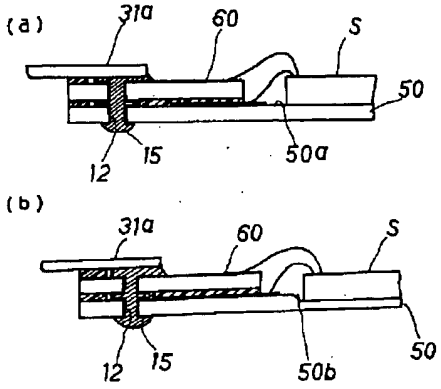
【図３】



【図2】



【図4】



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